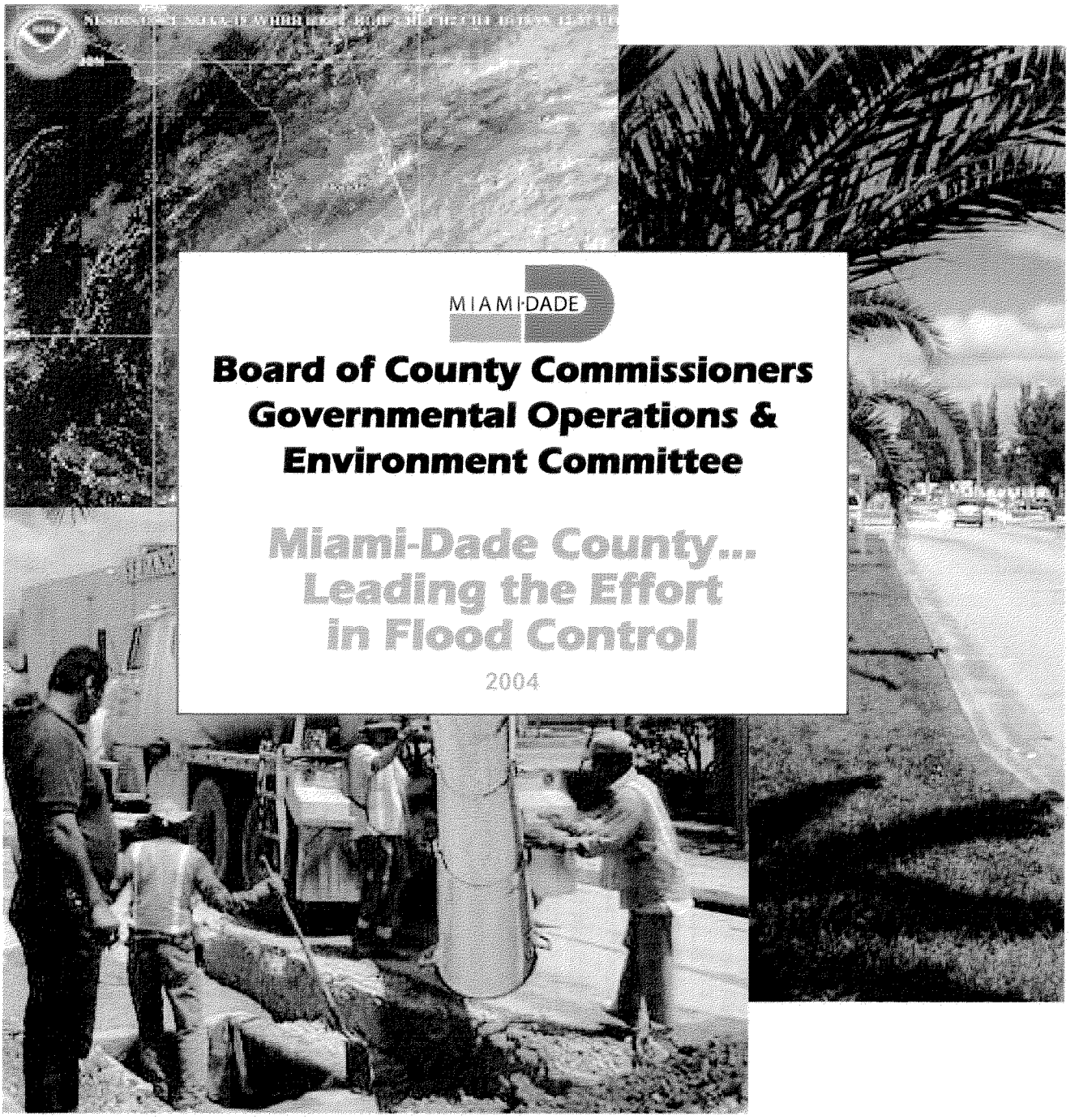
GOE
Agenda Item No. 7(G)
February 10, 2004



MIAMI-DADE

# Board of County Commissioners Governmental Operations & Environment Committee

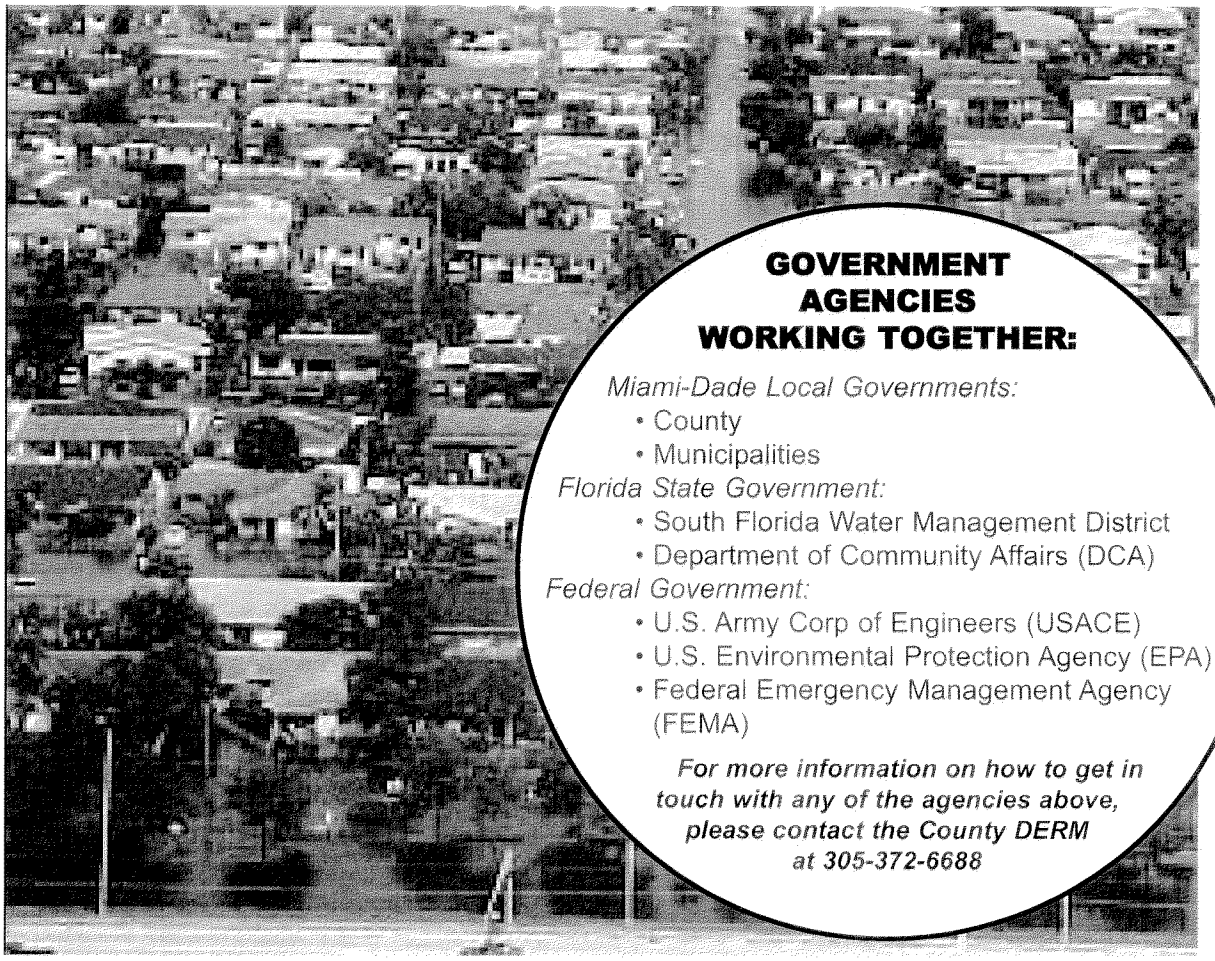
## Miami-Dade County... Leading the Effort in Flood Control

2004

# LEADING THE EFFORT IN FLOOD CONTROL

*During the early stages of Miami-Dade County's development, the land was frequently flooded for long periods of time due to the flat topography, low land elevations, and the high groundwater table in the Biscayne Aquifer. In the 1940's, to remedy the situation and make the land suitable for habitation, the U.S. Army Corp of Engineers (USACE) initiated construction of the majority of canal systems that are still used today. However, the excavation of the canal system exposed the Biscayne Aquifer, the County's primary source of drinking water, to saltwater intrusion. To control the flow of saltwater into the Aquifer, salinity control structures were constructed at the mouths of the primary and some secondary canals throughout Miami-Dade County. As additional development occurred throughout the County, tertiary systems for localized drainage were also put in place. With the primary, secondary, and tertiary systems working together, floodwaters are channeled into the ground and onto Biscayne Bay for improved flood control.*

*This report includes a brief background of key flood control issues, and a summary of Miami-Dade County Government initiatives to continually improve on the existing flood control infrastructure, while protecting our unique environment.*



**GOVERNMENT AGENCIES WORKING TOGETHER:**

*Miami-Dade Local Governments:*
- County
- Municipalities

*Florida State Government:*
- South Florida Water Management District
- Department of Community Affairs (DCA)

*Federal Government:*
- U.S. Army Corp of Engineers (USACE)
- U.S. Environmental Protection Agency (EPA)
- Federal Emergency Management Agency (FEMA)

***For more information on how to get in touch with any of the agencies above, please contact the County DERM at 305-372-6688***

# LEADING THE EFFORT IN FLOOD CONTROL

## Summary of On-Going Stormwater & Flood Control Efforts

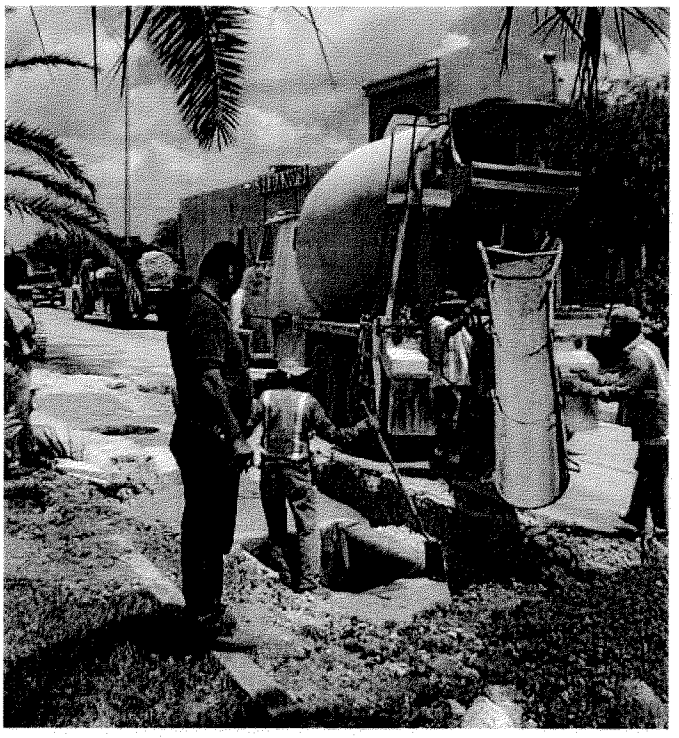
### Specific County Accomplishments and Efforts

- Approximately $17 million have been awarded in contracts to clean over 60,000 existing stormwater drainage structures. The Federal Emergency Management Agency (FEMA) drainage system cleaning activities were finalized by mid-2003.

- Approximately 200 miles of County secondary canals are being dredged to restore the canals' capacity, enhance flow, and prevent backup in flood-prone areas. More than $112 million have been awarded for engineering and other dredging construction activities for the County's secondary canals. An additional $100 million in dredging related construction contracts will be awarded by early 2004. The FEMA canal dredging activities will be completed by early 2005.

- The County is actively working with approximately 140 consulting firms and over 60 contractors to ensure that the FEMA program objectives are facilitated in the design and construction phases. Many of these contracts have been awarded at a record pace through the Mayor's Economic Stimulus Package and the County's Emergency Expedite Process.

- Miami-Dade County is one of a few in the nation awarded by FEMA a rating of 5 in the Community Rating System providing residents in flood zones in the unincorporated area of the County with a 25% discount on flood insurance policies. Those residents outside the flood zones receive a 10% discount. Savings realized by residents in 2003 total over $12 million.



*More than $161 million have been awarded for road restoration and drainage replacement work to date, with over 1,000 sites under construction. The FEMA road restoration and the drainage replacement activities will be completed by 2005.*

**KEY PROJECT STATISTICS:**

*Quality Neighborhoods Improvement Program (QNIP):* Over $76 million in flood control and prevention improvements completed and an additional $70 million planned; 275,000 linear feet of stormwater drainage pipes, and 4,700 drainage inlets/structures installed.

*FEMA/DCA/County:* Over $173 million completed and $117 million encumbered; over 3,000 projects underway including canal dredging, road restoration, replacement of drainage infrastructure, drainage system cleaning, and sidewalk restoration.

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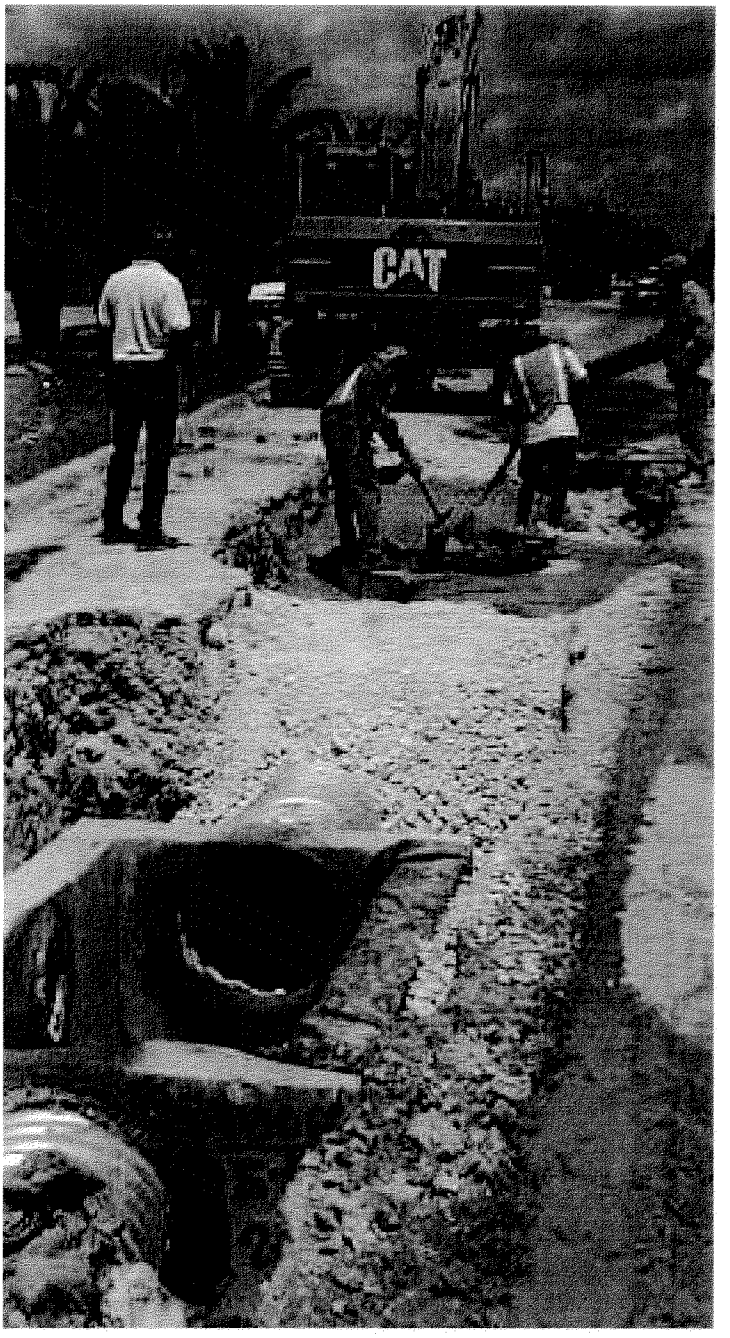
- The County continues its efforts to secure state appropriations for problem areas such as the Florida East Coast Railway (FEC) Borrow Ditch Canal.

- The County has formed a partnership with FEMA to update and improve the Flood Insurance Rate Maps (FIRMs). These maps are the primary tool for state and local governments to mitigate the effects of flooding in their communities. New FIRMs will more accurately depict the flood hazard throughout the County.

- Efforts have been increased to expedite the completion and implementation of the County Stormwater Management Master Plan (SMMP) by 2005.

- County staff has also continued to comment on the potential flooding impacts to County residents from future Comprehensive Everglades Restoration Plan (CERP) projects.

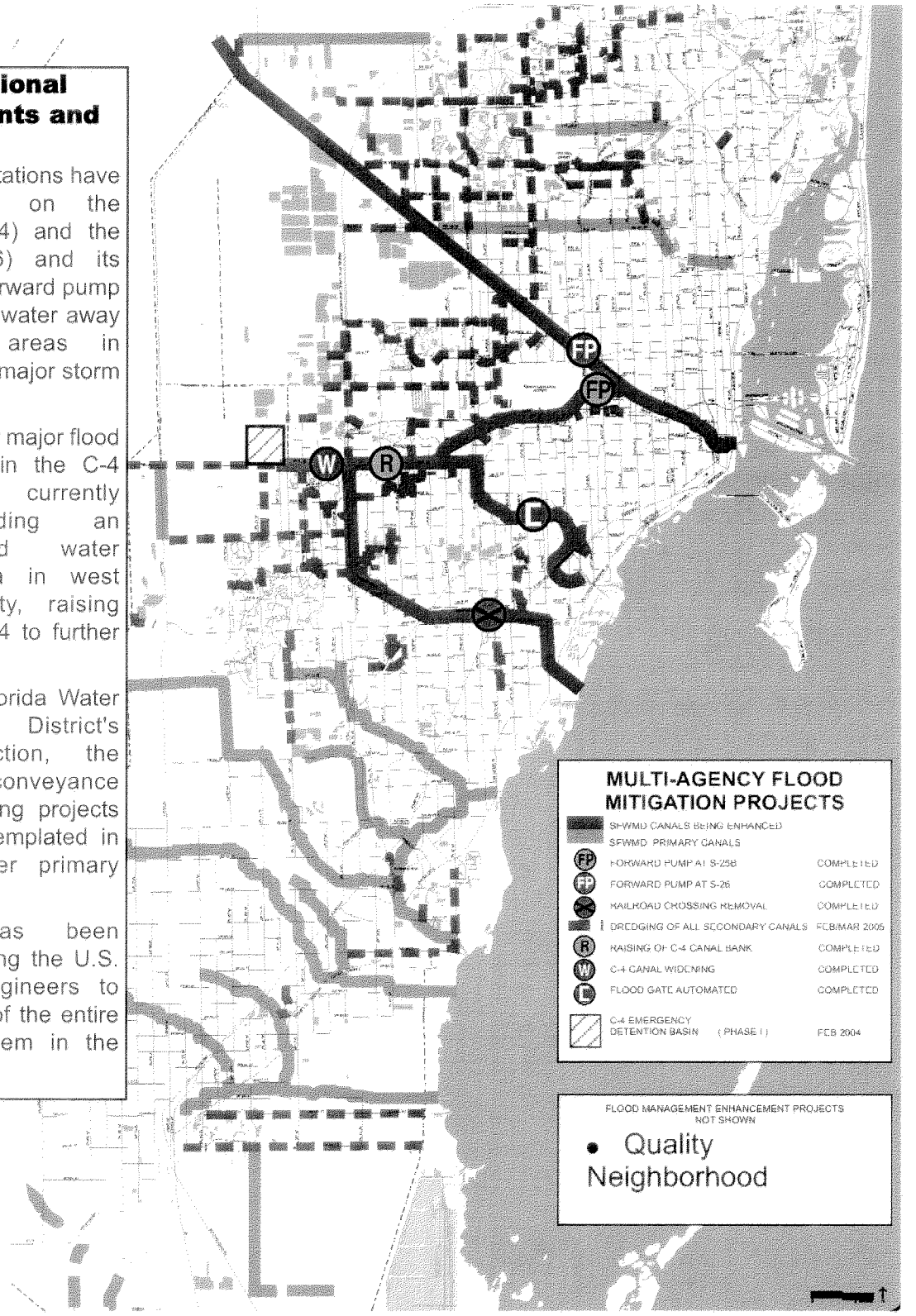



***The County has funded the construction of more than $76 million of drainage improvements since the County's Stormwater Utility was established in 1991. Planned and budgeted improvements for future years total another $70 million.***

# LEADING THE EFFORT IN FLOOD CONTROL

## Specific Regional Accomplishments and Efforts

- Two forward pump stations have been constructed on the Tamiami Canal (C-4) and the Miami Canal (C-6) and its tributaries. These forward pump stations move more water away from populated areas in advance and during major storm events.
- Construction of other major flood mitigation projects in the C-4 basin are also currently underway including an emergency flood water impoundment area in west Miami-Dade County, raising berms along the C-4 to further protect residents.
- Under the South Florida Water Management District's (SFWMD) jurisdiction, the primary canal conveyance improvement dredging projects are still being contemplated in the C-4 and other primary canals.
- The County has been instrumental in getting the U.S. Army Corp of Engineers to conduct a re-study of the entire primary canal system in the County.



# History, Responsibilities and Timelines

## U.S. Army Corp of Engineers (USACE)

The early design of the canal system by the USACE did not consider additional inflow from areas on the westerly parts of the County. Furthermore, the older more heavily urbanized areas of the County, to the east, are lower and more flood prone. Therefore, drainage from both the western and eastern areas cannot be effectively removed until the areas to the east are drained, and room is made available within all the canals to drain them. Groundwater flows in Miami-Dade County from the northwest to the southeast.

*Salinity Control Structure at a Secondary Canal*

## South Florida Water Management District (SFWMD)

All of the primary canals in the County are presently maintained and operated by the SFWMD. Some of these canals, as previously designed by the USACE, are inadequate to remove by gravity relatively large, sudden volumes of rainfall and large tidal surges. These conditions may be associated with heavy rains or a storm event with strong winds out of the east that would tend to build-up waters at the flood and salinity control structures.

## Biscayne Bay Surface Water Improvement and Management (SWIM) Plan

The establishment of Biscayne National Park in 1980 has protected most of the Bay from coastal development. Since 1988, analyses funded by SWIM have shown improvements of water quality. Its goals centered on water quality, water quantity, and environmental protection. Many areas of Biscayne Bay needed attention. Because SWIM resources were limited, the plan emphasized geographical areas where the most serious problems existed. The SWIM Plan is no longer funded. Alternative funding sources are now being used to continue its intent.

## State Legislative Appropriations Support

Local governments must respond to greater challenges as they protect the public's health, safety, and welfare. The Federal and State governments provide less financial assistance, yet both tiers of government have enacted legislation addressing stormwater management that demands local government action. Funding must be sought at the local level.

## U.S. Environmental Protection Agency (EPA) National Pollutant Discharge Elimination System (NPDES)

Requirements mandated by the Federal Government significantly affect the environmental and flood protection management of separate Municipal Stormwater and Sewer Systems (MS4). Specifically, the EPA's NPDES permit regulations for stormwater discharges became effective on November 16, 1990. These regulations included a two-step, two-year application, and permitting process involving the entire county public storm and sewer systems. The EPA issued the NPDES MS4 permit to Miami-Dade County and its co-permittees in 1996.

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The EPA evaluate stormwater countywide in an integrated and comprehensive manner. The permitting program requires the County to maintain water quality evaluation and monitoring activities and to develop a Stormwater Management Master Plan for the elimination of substandard stormwater discharge systems.

In addition, under the provisions of the "Florida Air and Water Pollution Control Act," local governments are required to develop stormwater management programs. The law also allows local stormwater utilities to be established, as well as adopt stormwater utility fees to plan, construct, operate, and maintain public stormwater management systems.

## Creation of the Miami-Dade County Stormwater Utility

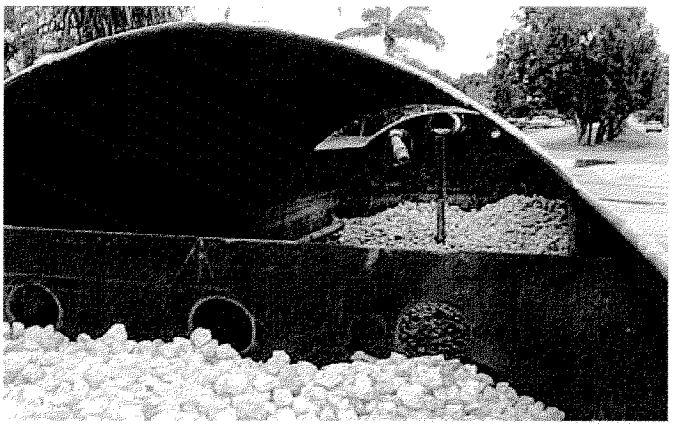
In order to comply with the mandated Federal requirements, and in accordance with State law, the Board of County Commissioners established the Miami-Dade County Stormwater Utility in 1991.

Although stormwater utilities are relatively new, they are quickly becoming the means by which local governments can meet the responsibility for properly managing the environmental impact of stormwater run-off as well as the need to provide adequate flood protection. Approximate 103 Florida governments have implemented stormwater utilities.

The County's stormwater utility provides significant environmental and flood protection benefits to its residents and properties by addressing stormwater run-off. Inadequate drainage systems are major contributors to the pollution of Biscayne Bay and other surface waters.

## County Quality Neighborhoods Improvement Program (QNIP)

In the last five years, the County has committed more than $76 million in local revenues to flood control and prevention projects. This comprehensive flood control effort, entitled the Quality Neighborhoods Improvement Program (QNIP), was initiated in fiscal year 1998 with the support of the Board of County Commissioners. Through QNIP, more than 275,000



*Inside a Sedimentation Tank used to remove particles before discharging to a tertiary drainage system or a body of water*

linear feet of stormwater drainage pipes and 4,700 drainage inlets and structures have been installed to improve stormwater management. Recognizing that flood control in South Florida is also a regional concern, the County is working closely with the USACE on a study regarding the performance of the regional canals management system within the County to determine additional capital improvements needed.

## County Flood Management Task Force

As a result of Hurricane Irene's countywide impacts, the Miami-Dade County Flood Management Task Force (Task Force) was created by the Board of County Commissioners in 1999.

The Task Force was charged with:

1. Investigating and analyzing the current and proposed flood management system with emphasis on the performance of the system during Hurricane Irene;
2. Recommending public and private sector opportunities to improve flood management;
3. Seeking ways to minimize the kind of property damage and disruptions such as those caused by Hurricane Irene.

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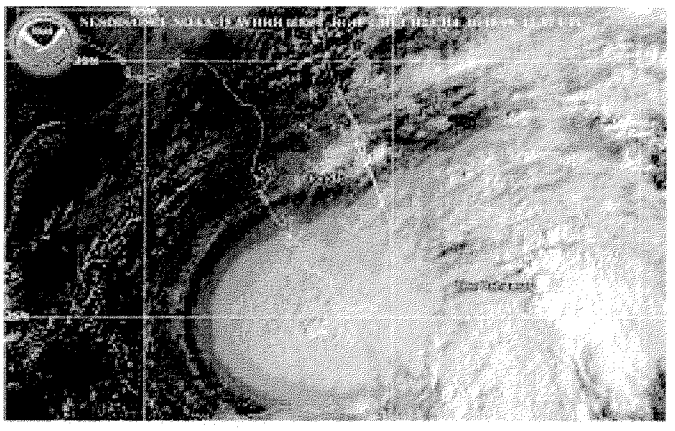


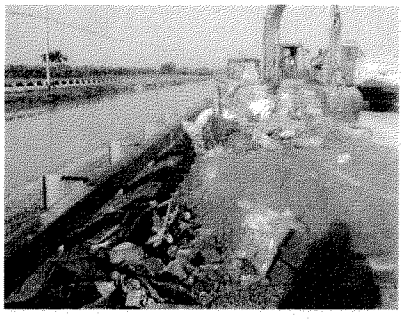
*Satellite View of Hurricane Irene*

## FEMA/State/County Program

Hurricane Irene in October 1999 and the No-Name Storm in October 2000 inundated much of Miami-Dade County. Many homes, public and commercial buildings, farms, and streets were flooded from several days to a couple of weeks. In many cases, the affected areas were only passable with military vehicles. Although the public drinking water system continued to function, power outages were plentiful and lasted between two to three days in most areas, and up to a week in other cases.

Since the program's inception, more than $740 million from the Federal Emergency Management Agency's (FEMA) public assistance program has been allocated from both storm events for restoration and flood mitigation projects. Both the State Department of Community Affairs (DCA) and Miami-Dade County are committed to paying 12.5% cost share apiece, currently estimated to exceed $90 million, for a total local match of approximately $180 million. The County, in close coordination with FEMA, is moving forward with comprehensive efforts to mitigate damage and reduce severe and chronic flooding countywide.

The County is currently undertaking over 3,000 projects that include canal dredging, roadway restoration, roadway paving, drainage replacement, drainage system cleaning, and sidewalk restoration. These projects will reduce the chances for a re-occurrence of flood damage to these areas in the future. The County disaster recovery efforts have also permitted the State of Florida to leverage additional federal funding for related flood control and mitigation activities.



***Secondary canal dredging to remove sediments accumulated in the canal as a result of the No-Name Storm***

## Local Mitigation Strategies (LMS) and Other FEMA Grants

In addition to the FEMA funding for recovery and mitigation projects to restore damage caused by Hurricane Irene and the No-Name Storm, FEMA funding of an estimated $45 million was also made available through LMS and other grants. These additional sources of funding are continually being pursued by the County to supplement and expand flood control and drainage infrastructure improvements.

## Funding Sources

The following is a summary of various funding sources available to the County to implement flood control and drainage infrastructure improvements to effectively reduce the frequency and intensity of flooding events in the future. Current funding totals over $850 million, of which over $740 million are funded through the FEMA program.

1. State Appropriations
2. FEMA/State/County Recovery and Mitigation, LMS and other grants
3. County Stormwater Utility Fees
4. County Stormwater Utility QNIP Bond
5. County General Obligation Bonds
6. County Secondary Gas Option Tax.

# LEADING THE EFFORT IN FLOOD CONTROL

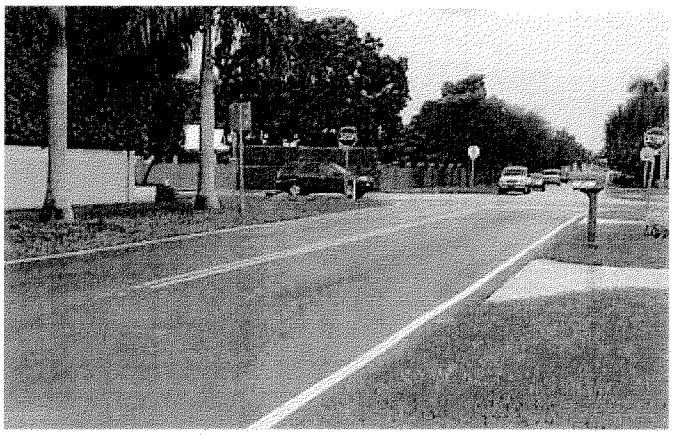
## System Management and Operations

Today, the canal system in Miami-Dade County is a network of more than 620 miles laid out in an approximate one to two mile-wide grids. The canal system is divided into 360 miles of primary canals, 260 miles of secondary canals, and tertiary localized drainage systems, which channel floodwaters into the ground. The primary system, originally designed for 2 million South Florida residents currently serves over 6 million. It includes most of the salinity control structures, and is owned and operated by the South Florida Water Management District. The secondary system is the responsibility of the County. In general, the secondary canal system connects into the primary system, which connects into the Biscayne Bay. Furthermore, the ability to move water in the secondary system is dependent on the available capacity in the primary system, which, in turn, is dependent on the proper operation of the salinity control structures and environmental conditions.

The principal functions of the canal system are as follows:

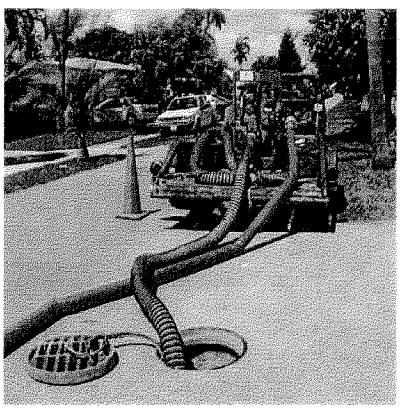
1. To maintain adequate ground water levels in the Biscayne Aquifer to provide for water supply and to prevent saltwater intrusion. In general, the canal system re-supplies the Biscayne Aquifer during the dry season when flow is conveyed from Lake Okeechobee. Conversely, during the wet season, ground water flows from the aquifer into the canals and is discharged to tide, as needed, to prevent flooding.
2. To provide for drainage during periods of excess rainfall.

Flood protection in the County is provided by filling the land to the minimum Miami-Dade County Flood Criteria elevations, and by the proper operation of the primary and secondary canal systems. Thus, the Water Control Plan for Miami-Dade County consists of two elements. The first is the canal system and all its components such as canals, bridges, culverts and salinity control structures. The second is Chapters 24 and 28 of the Miami-Dade County Code, which contain all the regulations for proper drainage of the land and protection of water resources. The Directors of the Environmental Resources Management and Public Works Departments have the authority to implement Chapters 24 and 28, respectively, of the Miami-Dade County Code.



*Roadway restoration and paving to repair damage caused by Hurricane Irene and the No-Name Storm*

*Drainage replacement to repair damage to the tertiary drainage infrastructure caused by Hurricane Irene and the No-Name Storm*



*Pump used to remove water from manhole, showing one of the many activities involved in the cleaning of drainage structures, which are part of the tertiary drainage systems*

# County Legislative Index
## Focal Records

| Action | Date | BCC Resolution Number |
|---|---|---|
| Establishment of the local Stormwater Utility Ordinance | Effective on June 30, 1991 | As amended, codified in Chapter 24, Article IV, of the Code of Miami-Dade County, |
| Creation of Flood Management Task Force (Task Force) | October 19, 1999 | R-1164-99 |
| Request that the USACE and the South Florida Water Management District not increase canal water levels until the Task Force issues and reviews its report. | February 25, 2000 | R-162-00 |
| Award of Cooperative Agreement with South Florida Resource, Conservation & Development Council (Engineering of nineteen canals and dredging of one canal) | December 19, 2000 (Various Modifications Have Followed) | R-1406-00 |
| Urging the USACE not to implement Alternative 7R of the Interim Operation Plan (IOP) because it raises canal levels, until flood protection impacts are sufficiently evaluated | July 23, 2002 | R-897-02 |
| Increasing the contract ceiling on the C02-DERM-EEC Contract for secondary canal dredging | September 24, 2002 | R-1018-02 |
| Resolution requesting the State Legislature to withhold any orders and stay any actions that could disrupt the completion of the FEMA Program | March 11, 2003 | R-245-03 |
| Modifications to the County Hauling Pool Contract Bid Number 7132-4/07-OTR-LW | April 22, 2003 | R-379-03 |
| Authorization to award new open competitive contracts for FEMA secondary canal dredging work | April 22, 2003 | R-379-03 |
| Resolution increasing the contract ceiling on the C01-DERM-EEC Contract, extending its contract time, and authorization to award additional open competitive contracts for road reconstruction, resurfacing, and drainage | April 22, 2003 | R-378-03 |
| Urging the USACE and the South Florida Water Management District to operate the water management system at the lowest feasible levels in order to maximize flood protection during the wet season | September 11, 2003 | R-995-03 |
| Increasing the cap of the County Hauling Contract from $5 to $15 million | September 9, 2003 | R-989-03 |
| Ratification of contracts awarded under the Expedite Ordinance Number 00-104 for FEMA/DCA/County Engineering Services and Related Construction | Various | Various |
| Memoranda or Agreements with various Municipalities | Various | Various |
| Amendments to the Code of Miami-Dade County | Various | Various |
| Ratification of mapping activities statement between DCA, FEMA and the County | | Forwarded by GOE Committee to BCC with a favorable recommendation on November 14, 2003 |



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